Abstract

A sulfur scrubbing method and structure is operable to remove substantially all of the sulfur present in an undiluted oxygenated hydrocarbon fuel stock supply which can be used to power an internal combustion engine or a fuel cell power plant in a mobile environment, such as an automobile, bus, truck, boat, or the like, or in a stationary environment. The fuel stock can be gasoline, diesel fuel, or other like fuels which contain relatively high levels of organic sulfur compounds such as mercaptans, sulfides, disulfides, thiophenes, and the like. The undiluted hydrocarbon fuel supply is passed through a desulfurizer bed which is provided with a high surface area nickel reactant, and wherein essentially all of the nickel reactant in the scrubber bed reacts with sulfur in the fuel stream, so as to remove sulfur from the fuel stream by converting it to nickel sulfide on the scrubber bed. The desulfurized organic remnants of the fuel stream continue through the remainder of the fuel processing system in the fuel cell power plant, or through the internal combustion engine. The desulfurizer bed is preferably formed from a high surface area ceramic foam monolith, the pores of which are coated with the high surface area nickel reactant. The use of the foam monolith combined with the high surface area of the reactant, enables essentially 100% of the nickel reactant to come into contact with the fuel stream being desulfurized. The scrubber bed can also be formed from high surface area nickel coated alumina pellets, from a high surface area nickel coated ceramic extrusion, from high surface area nickel pellets, and from high surface area nickel extrudates.